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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/617,226 | 07/11/2003 | Sung-Kwon Lee | P68989US0 | 2348 |

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| EXAMINER |
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VINH, LAN

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| ART UNIT | PAPER NUMBER |
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1765

DATE MAILED: 03/31/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|--------------------------------------|--------------------------------------|--|
| Office Action Summary | Application No. 10/617,226 | Applicant(s) SUNG-KWON LEE | |
| | Examiner Lan Vinh | Art Unit 1765 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 10/617,226.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 is indefinite for the use of improper Markush language. The examiner suggests replacing "a group" with --the group--

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-4, 7, 9, 13 are rejected under 35 U.S.C. 102(b) as being anticipated by Linliu (US 6,287,957)

Linliu discloses a SAC process comprising steps of:

forming plurality conductive patterns arranged with predetermined spacing distance substrate, each conductive pattern including conductive layer 54 and barrier/hard mask nitride layer 64 (col 2, lines 64-65, col 3, lines 5-10; fig. 2A)

forming a planarized inter-layer insulation layer 66 on the entire surface (col 3, lines 12-14; fig. 2A)

etching the inter-layer insulation layer 66 through use of a dry etching process so that height inter-layer insulation layer lower than that of the barrier/hard mask nitride layer 64 (col 3, lines 21-23; fig. 2B)

forming SiN layer 68/etch stop layer along the inter-layer insulation layer 66 (col 3, lines 22-23; fig. 2B)

forming self-aligned contact hole of which partial portion expands towards each conductive pattern etching selectively the etch stop layer and the inter-layer insulation layer until surface partial portion the substrate disposed within the predetermined spacing distance exposed (col 3, lines 61-67; fig. 2E)

forming self-aligned contact structure by filling the self-aligned contact hole with a plug of conductive material (col 4, lines 1-2)

Regarding claim 2, Linliu discloses that the layer 68/etch stop layer has a thickness of 50-500 angstroms (col 3, lines 15-17)

Regarding claim 3, Linliu discloses the layer 66 is a silicon oxide layer (col 3, lines 12-14)

Regarding claim 4, Linliu discloses that layer 64/hard mask layer having a thickness of 100-1000 anstroms (col 3, lines 8-10)

The limitations of claims 7, 9 have been discussed above

Regarding claim 13, Linliu discloses the step of forming a mask 70 for the contact hole (col 3, lines 21-22)

4. Claims 1, 7 are rejected under 35 U.S.C. 102(b) as being anticipated by Kuo (US 6,277,727)

Kuo discloses a method for forming a landing pad comprising steps of:

forming plurality conductive patterns arranged with predetermined spacing distance substrate, each conductive pattern including gate conductive layer and hard mask nitride layer 42 col 3, lines 35-40; fig. 9)

forming a planarized inter-layer insulation layer 40 on the entire surface (col 3, lines 34-35)

etching the inter-layer insulation layer 40 through use of a dry etching process so that height inter-layer insulation layer lower than that of the hard mask nitride layer 42 (col 3, lines 45-47; fig. 11)

forming filling layer 48/etch stop layer along the inter-layer insulation layer 40(col 3, lines 53-55)

forming self-aligned contact hole of which partial portion expands towards each conductive pattern by etching selectively the etch stop layer and the inter-layer insulation layer until surface partial portion the substrate disposed within the predetermined spacing distance exposed (col 3, lines 60-63; fig. 14)

forming self-aligned contact structure by filling the self-aligned contact hole with a plug of conductive material (col 3, lines 64-65)

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claims 5-6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Linliu (US 6,287,957) in view of Wang et al (US 6,074,959)

Linliu method has been described above. Unlike the instant claimed invention as per claim 5, Linliu fails to disclose etching the interlayer insulating from an upper part of the hard mask until reaching a specific thickness

Wang, in a method of etching oxide, discloses that the oxide/insulating layer etch rate based on the process parameters such as the etchant flow rates (col 11, lines 27-60)

Hence, one skilled in the art at the time the invention was made would have found it obvious to vary/optimize the process parameters in Linliu oxide etching step to achieve a specific etched thickness of the oxide because Wang serves as an evidence that etch rate is a result-effective variable

Regarding claim 6, Linliu discloses that the insulating layer 66 comprises silicon oxide (col 3, lines 12-14)

7. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Linliu (US 6,287,957) in view of Kim et al (US 6,448,179)

Linliu method has been described above. Unlike the instant claimed invention as per claim 8, Linliu fails to disclose using a photoresist pattern formed by employing a photo-exposure process using a light source of ArF

Kim discloses a method for fabricating a semiconductor device comprises the step of using a photoresist pattern formed by employing a photo-exposure process using a light source of ArF (col 1, lines 31-32)

One skilled in the art at the time the invention was made would have found it obvious to modify Linliu's method by using a photoresist pattern formed by employing a photo-exposure process using a light source of ArF as per Kim because Kim discloses that a photoresist pattern typically require a deep ultra violet light exposure which generate a small wavelength, for example ArF (col 1, lines 28-30)

8. Claims 10-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Linliu (US 6,287,957) in view of Wang et al (US 6,183,655)

Linliu method has been described above. Unlike the instant claimed invention as per claim 8, Linliu fails to disclose using a main etch comprises of C3F8, CH2F2 and argon during the SAC etching process

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Wang discloses a plasma etch process comprises the step of etching a SAC using a etching gas of C3F8, CH2F2 and argon (col 14, lines 10-35)

Hence, one skilled in the art at the time the invention was made would have found it obvious to modify Linliu SAC etching step by using an etching gas comprises of C3F8, CH2F2 and argon as per Wang because Wang discloses that the better etch selectivity could be obtained with a combination of CF gas and CHF gas (col 14, lines 19-23)

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 571 272 1471.

The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571 272 1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>.



LV

March 29, 2005